A reconfigurable Ultra Wide Band (UWB) compact tree-design antenna system

Abstract

A novel compact tree-design antenna (NCTA) with the ability of reconfigurable ultra-wideband (UWB) of 3.1 GHz to 10.6 GHz to five multi-narrowband applications is proposed. This antenna has a novel radiating element design that consists of seven small circles (7-filter) surrounding a central circle. Moreover, the NCTA incorporates the 7-filter that functioned as filter into the antenna design. The compact 38mm×38mm antenna integrates three PIN diode switches, which are connected to a single National Instrument Data Acquisition (NI-DAQ) Board. The DAQ itself is controlled (ON/OFF state) by a virtual instrument known as "Lab VIEW Interface Software". The activation of specific PIN diode switches in the configuration that is controlled by the DAQ then, in turn, determines the frequency agility. The presented antenna is capable of performing up to five multibands. The operating frequencies are as follows; band 1 (2.72- 11.8 GHz), band 2 (2.4-4 GHz, 5.3-11.6 GHz), band 3 (2.7-6.5 GHz, 7.1-11.6 GHz), band 4 (2.7-4.4 GHz, 5.2-6.5 GHz, 7.1-11.7 GHz) and band 5 (2.6-3.5 GHz, 4.8-7.0 GHz, 7.4 GHz-11.5 GHz). Furthermore, the antenna has a gain of up to 6 dBi which is considered better than that of conventional antenna. The proposed antenna produces a proficient divisive radiation pattern at 4 and 6 GHz. The experimental results exhibit the success of the antenna performance. It is competent as future candidate for cognitive radio and military applications.